

1.14.17. RATIONAL DESIGN AND OPERATION OF STEEL TRUSSED RAFTERS IN CONDITIONS OF AGGRESSIVE MEDIA

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Performed on-site examinations of metal structures in operating workshops of different industry branches show that trussed rafters appear to be the most worn out. Analysis of operation of rafters and measures on their protection against corrosion confirms the fact that rafters in their overwhelming majority are operated without proper protection against corrosion. Furthermore, little attention is paid to the technical and economic substantiation of other options of anti-corrosion measures for rafters. Therefore, there were performed researches directed toward optimization of the package of measures on improvement of durability of typical steel trussed rafters operated in conditions of strongly and moderately aggressive media. Actual service life of some metal structures, which is defined mainly by physical wear (while for buildings with aggressive medium – by corrosion wear), is not always equal to the standard operation time of buildings. Analysis of interrepair periods of metal structures shows that recommended overhaul periods for metal structures do not comply with operational practice. It is the result of the fact that the whole number of factors like steel brand, structural form, system of coverings, etc., is not taken into account. Economic efficiency was calculated by reduced costs being the function of following arguments: estimated cost of actual structure; cost of renewal of anti-corrosion protective coatings; service life of coatings; standard operation time of industrial buildings taking into account cost of reinforcement of broken elements; and service life of trussed rafter elements not protected with anti-corrosion protective coatings, etc. Therefore, methodology of optimization of various options of design solutions and operational measures is elaborated under criterion of reduced costs. Recommendations on designing and operation of trussed rafters in conditions of strongly and moderately aggressive media provide the following:

- selection of the system of anti-corrosion protective coatings being optimal for specific conditions;
- economically justified application of the most corrosion-resistive steels;
- application of corrosion-resistive structural trusses;
- selection of the rational truss span.

Proposed recommendations are elaborated by the results of technical and economic analysis of the package of measures on improvement of durability of steel trussed rafters, including both methods of their initial protection and operation. However, strict compliance with technical operation rules is the fundamental condition for improvement of durability of steel trussed rafters.

With initial protection against corrosion at the manufacturing stage by means of the system of anti-corrosion protective coatings, times of repair of the trussed rafter elements should be shifted by the service life of coatings system from the beginning of their operations.

Steel trussed rafters being in operation in conditions of strongly and moderately aggressive media should not be subjected to further operation without periodical renewal of broken anti-corrosion protective coatings by the system of paint-and-lacquer coatings. Also, operation without any protection is recommended with reinforcement of broken elements as their load-bearing capacity exhausts irrespective of the service life of industrial buildings.